

SEVERE LOCAL STORMS, MAY 1941—Continued

Place	Date	Time	Width of path yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Clarkfield, Benson, and Comfrey, Minn., and vicinities.	14	6:30-11:30 p. m.	120		81,000	Hail	Moderate to heavy hail in connection with a tornado, caused damage to growing crops and property. Some livestock and much poultry perished and trees were stripped of leaves and branches, path 25 miles long.
Comfrey, Minn., and vicinity.	14	8:20 p. m.		1	150,000	Tornado	Many farm buildings demolished, livestock killed, trees uprooted, loss to crops, path 7 miles long.
Comfrey, Minn., and vicinity.	14	do.			35,000	Rain and flood	Heavy to excessive rains that accompanied a tornado washed out 50 feet of railway grade, flooded lowlands; inundated highways and damaged growing crops.
Lanesboro and Cannon Falls, Minn.	15	1-2 a. m.			100,000	Electrical	A community hall and large grain elevator with 17,000 bushels of grain burned.
Denver, Colo.	15	2:30 p. m.		0		Tornado	Storm not severe, no damage reported.
Kimball County, Nebr.	15	3:30 p. m.	12-4		10,000	Hail	Principal damage to winter wheat.
Union, Marshall and Benton Counties, Iowa.	15	4 p. m.			1,500	do.	In Union County damage to greenhouse amounted to \$1,500; other damage in this area unknown.
Iowa, Elkhart to Bondurant eastward into Jasper County.	15	4:30-5 p. m.	12		143,000	Wind and hail	Large hailstones, some 9 inches in circumference. Property damage, \$55,000; crop loss, \$72,000; livestock lost, \$16,000.
Sherman and Thomas Counties, Kans.	10	7:30 p. m.	15		100,000	Heavy hail	Large hailstones caused loss in wheat, path 25 miles long.
Rooks County, Kans.	15	10-11 p. m.	110		172,800	do.	Over 60,000 acres of wheat damaged, some a total loss. Livestock lost and automobiles damaged, path 30 miles long.
Bradshaw, Nebr., 5 miles north.	15	11 p. m.	11		20,000	Tornado and hail	Loss to crops from hail, \$10,000; property damaged and livestock killed by tornado, \$10,000.
Decatur County, Kans.	15	11-12 p. m.	14		20,000	Heavy hail	Loss in wheat, path 8 miles long.
Lucas and Paradise, Kans.	15	11:20-12 p. m.		0	75,000	Tornado	Property damaged, 3 persons injured, path narrow and 15 miles long.
Adams to Nemaha Counties, Nebr.	15-16	Noon to 2 a. m.	150		25,000	Hail and wind	Damage extended across parts of 7 counties. Loss to crops, \$175,000; property damage and loss to livestock, \$75,000.
Rooks to Clay County, Kans.	15-16	11 p. m.-1 a. m.	150		75,000	Wind and hail	Chief loss in crops from hail, path 110 miles long.
Shawnee County, Kans.	16	1:53 a. m.	67	0	25,000	Tornado	Property damaged, some cattle killed, some large trees blown over and power lines damaged, path a mile long.
Clay County, Kans.	16	7 a. m.	15		10,000	Heavy hail	Loss in wheat, path 28 miles long.
Columbus, Kans., southwestern portion.	16	3 p. m.	13		10,000	do.	Roofs and gardens damaged; loss in wheat, barley, and rye; path 6 miles long.
Ocean View, Va.	17	5 p. m.		2	2,000	Thundersquall	15 or 20 fishing boats overturned.
Kenesaw, Nebr.	19	10 p. m.	12		10,000	Hail	Loss to crops, property damaged.
Roanoke, Va.	23	5:58 p. m.	880		5,000	Thundersquall	Property damaged.
Gem, Boise, and Canyon Counties, Idaho.	24	5 p. m.	120	1	3,400	Electrical	Farmhouse burned, power lines damaged, path 50 miles long.
Knapp, Tex.	26	4 p. m.	11		2,000	Hail	Loss mostly in cotton and fruit, some damage to roofs.
Trempealeau, Wis., vicinity of.	27	5:30 p. m.	2,640		500	Wind	Property damaged.
Brodhead, Wis., vicinity of.	27		11		20,000	Straight-line wind	Property damaged, path 7 miles long.
Lincoln, Redwood, Kandiyohi, Wright, Hennepin, Ramsey, and Goodhue Counties, Minn.	28	3-7 p. m.			57,500	Hail and heavy rain.	Considerable damage to growing crops in places. In the Twin Cities sewers overflowed and flooded low street intersections and basements.
Minnesota, southern and central counties.	28	do.			8,150	Thundersqualls	Farm buildings damaged and trees uprooted or branches blown off.
Atwater, Minn., and vicinity.	28	3 p. m.		0	40,000	Possible tornado	Farm buildings partially or totally destroyed, livestock killed, poles and wires down, trees uprooted, path 10 miles long.
Delhi, Minn., and vicinity.	28	3 p. m.	67	0	20,000	do.	Buildings demolished, roofs blown off, poles and wires down, poultry and livestock killed and loss in crops, winds rotary, path 2 miles long.
Portage County, Wis.	28				4,000	Wind	Property damaged.
Hondo to Riverside, N. Mex.	29	2-4 p. m.	880		10,000	Heavy hail	Loss in fruit.
Trujillo, N. Mex.	29				600	Hail	Lambs killed.
Pierre to Blunt, S. Dak.	29-30					Heavy rain and flood.	Several small dams washed, 3,000 feet of railroad track and several hundred feet of highway washed out or undermined.
Springfield, Minn., and vicinity.	29-30				100,000	Rain and flood	Heavy to excessive rains washed out railroad tracks, inundated lowlands, drowned poultry, and flooded streets and basements.
Richfield, Idaho.	30	3 p. m.	2		500	Heavy hail	Property damaged, path 2 miles long.
Balmorhea, Tex., vicinity of.	31	4-6 p. m.	2,640		25,000	Hail	Loss chiefly in cotton and alfalfa.
Big Horn, Mont.	31	4:30-5:45 p. m.	12		4,000	do.	Loss in beets and winter wheat, path 20 miles long.
York County, Nebr.	31	5 p. m.	15		15,000	Wind and hail	Loss to crops from hail, \$10,000; property damage, \$5,000.

¹ Miles instead of yards.

SEVERE LOCAL STORMS, JUNE 1941

[Compiled by MARY O. SOUDER]

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Horace, Kans., 2 miles north-east.	1	3:20 p. m.	25	0	\$5,000	Tornado	Property damaged, several vortex clouds seen, path 3 miles long.
Wilmington, N. C.	2	1:07-2:25 p. m.			3,000	Thundersquall	Property damaged, number of trees broken off or uprooted.
Ross, Tex.	2		18		5,000	Wind	Property damaged, slight crop loss.
Bluewater, N. Mex.	3	1-1:05 p. m.	14		3,000	Hail	Loss to crops.
Bluewater, N. Mex.	4	2-2:05 p. m.	14		3,000	do.	do.
Bluewater, N. Mex.	5	11-11:10 a. m.	14		3,000	do.	do.
Roswell, N. Mex.	5	6-7 p. m.	12		5,000	do.	Loss in crops, mostly cotton.
De Quincy, La., vicinity of.	7	9:55 a. m.	17	3	400	Tornado	Small house destroyed, 3 occupants killed and 8 others injured.
Winona, Kans., and vicinity.	7	6 p. m.	12		100,000	Hail	Chief loss to crops. Only \$1,000 property damage, path 9 miles long.
Hugoton, Kans.	7	8-10 p. m.	13		125,000	do.	Principal loss in wheat. Storm accompanied by torrential rains and a tornado, path 8 miles long.
Hugoton, Kans.	7	9:30 p. m.	880		50,000	Tornado	Chief damage along scattered path, about 16 miles.
Copeland, Kans., and vicinity.	7	11 p. m.	100		4,000	Wind	Property damaged, storm had tornadic characteristics, path about a mile long.
Progreso, N. Mex.	7-8				1,000	Sandstorm	Loss to crops, fields damaged.
Silverton, Tex.	8	4 a. m.	880	0	4,000	Tornado	Damage to buildings, crop loss unknown.
Coffey County, Kans.	8	Noon	66	0	500	do.	Property damaged in rural districts, path 5 miles long.
Ruleton, Kans.	8	4:30 p. m.	440	0	140,000	Tornado and hail	Data given for path in Kansas. Storm apparently originated in Cheyenne Wells, Colo. Greater part of damage from tornado at Ruleton, where a consolidated school building, 5 residences and several other buildings were damaged. Storm ended 10 miles north of Goodland. Damage from tornado, \$40,000; damage from hail, \$100,000; path 20 miles long.

¹ Miles instead of yards.

SEVERE LOCAL STORMS, JUNE 1941—Continued

Place	Date	Time	Width of path yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Belleville, Kans.	8	5 p. m.		0	\$5,000	Tornado	Property damaged, path narrow and short.
Wellington and Belle Plain, Kans., and vicinities.	8	5:30 p. m.	440	0	10,000	do	Damage to rural property and crops, path 12 miles long.
Quinter, Kans.	8	5:30-6:30 p. m.		0	50,000	do	Farm buildings damaged and several persons injured, path narrow and 50 miles long.
Tatum, N. Mex.	8	7 p. m.			1,000	Hail	Loss in crops.
Sedgwick, Butler, and Marion Counties, Kans.	8	10:30-11:30 p. m.	880	8	180,000	Tornado	Property damaged in rural districts, about 20 persons injured, \$30,000 loss in crops, path 42 miles long.
Littlefield, Tex., vicinity of	9	4 a. m.	100	2	3,500	do	Property damaged, 11 persons injured.
Kress, Tex., and vicinity	9	4:15-4:30 a. m.	100	1	6,500	do	Property damaged, 12 persons injured.
Clarendon, Tex.	9	5 a. m.	67	1	500,000	do	Amount estimate of property damage, crop loss unknown.
Hallsville, Tex.	10	2:10 p. m.	880	0	3,000	do	Property damaged.
Mooringsport, La.	10	2:14 p. m.	100	0	80,000	do	Storm originated near Hallsville, Tex., moved east-northeastward crossing Louisiana State line in the vicinity Mooringsport, moving northeastward to the vicinity of Belcher; 2 persons were injured; property damage \$70,000; loss to crops, \$10,000; length of path 60 to 70 miles.
Pearsall, Tex.	11	7:30 p. m.	12	0	6,000	do	Property damaged.
Abilene, Tex.	13	5:32-5:45 p. m.	1-2		40,000	Hail	Only property damage estimated; considerable loss in wheat, oats, barley, and cotton not estimated.
Kaufman, Tex.	13		12		27,000	do	\$25,000 loss in cotton, corn, and other grain; \$2,000 property damage.
Raton, N. Mex., vicinity of	14	3-4:30 p. m.	880		2,500	Heavy hail	Loss in crops.
Bellview, N. Mex., 10 miles west.	14	5 p. m.	12		10,000	do	Do.
Post, Tex.	15	2:30 p. m.	13		25,000	Hail	Loss in cotton, corn, and wheat.
Clayton, N. Mex.	16	3:10-3:34 p. m.	11		1,000	Heavy hail	Property damaged.
Grenville, N. Mex.	16	P. m.	15		4,000	do	Loss in crops.
Grenville, N. Mex.	18	2:15-3:30 p. m.	12		2,800	do	\$800 loss in crops, \$2,500 damage to roofs.
Prairie County, Mont.	19	5 p. m.	11		10,000	do	Loss in wheat and alfalfa, path 36 miles long.
Dawson, Richland, and Roosevelt Counties, Mont.	19	5-7 p. m.	14		20,000	Hail and wind	Loss in wheat, oats, small grain, and gardens; property damaged; path 50 miles long.
Glacier Park and Browning, Mont.	24	5-6:15 p. m.	13		10,000	do	Property damaged, slight crop loss, path 50 miles long.
Richland County, Mont.	27	2-11 p. m.	120		280,000	Wind, hail, and rain.	3 or 4 separate storms covered the entire county during this period; large number of baby chicks and turkeys and some lambs killed with \$250,000 loss; property damage, \$30,000; path 60 miles long.
Kaufman, Tex.	27	3:30-5 p. m.	12	0	10,000	Tornado	Property damage, \$10,000; much loss in corn not estimated.
Carbon, Big Horn and Yellowstone Counties, Mont.	28	2-5:30 p. m.	12		35,000	Hail	Beans, sugar beets, wheat, and gardens damaged.
El Paso, Tex., 5 miles west	28				1,100	Hail and wind	Property damaged.
Fergus and Petroleum Counties, Mont.	28		13		50,400	Hail	Loss chiefly in grain and alfalfa, some windows broken, path 25 miles long.
Britton, S. Dak., vicinity of	29	8:30 p. m.		0		Tornado	Farm buildings and a school damaged over a path several miles long.
Formosa, Kans.	30	1-1:30 a. m.	15		150,000	Hail	Total loss of all unharvested grain, path 12 miles long.
Burdett, Kans.	30	P. m.	11		8,000	Heavy hail	Loss in wheat, path 5 miles long.

¹ Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR JUNE 1941

SOLAR RADIATION OBSERVATIONS

BY HELEN CULLINANE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937 and April 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison,

Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

Total solar and sky radiation during June was excessive at all stations except Lincoln, Madison, La Jolla, Friday Harbor, and Newport, where it was just barely below normal.

Radiation at normal incidence was below normal at all stations. Some measurements were made at Blue Hill during some severe forest fires, thus showing the effect of yellow smoke on radiation received.

The recalibration of pyrheliometers at three more stations—Lincoln, Madison, and New York—was completed during the month, and corrected data for the period, January–May, will be found in this issue.

Polarization observations made at Madison on 9 days gave a mean of 49 percent—10 percent below normal—with a maximum of 60, 6 percent below the normal maximum for the month.